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ABSTRACT

This paper provides a collection of materials and suggestions concerning students with attention deficit disorders (ADD) in mainstream mathematics classes. The presentation begins with a summary of selected standards from the National Council of Teachers of Mathematics' Professional Standards and raises the question of whether attention deficits are addressed within the Standards. It continues with an analysis of statistics on the incidence of attention deficit disorders; an outline of developmental demands for attention at different stages (from preschool through high school); an illustration of one model of the brain's operation; a listing of behaviors and mathematical indicators associated with the specific attentional problems of hyperactivity, distractibility, and impulsivity; and lists of mathematical concepts likely to be troublesome to ADD students and those mathematical concepts that ADD students often like. Specific strategies for teachers are organized into descriptive lists dealing with classroom management, teaching techniques that focus on the strengths of ADD students and those of all students, homework and the ADD student, and assessment strategies for ADD students. The paper concludes with a listing of psychological factors of ADD. (Contains 20 references for teachers and children.) (DB)

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Attention Deficit Disorders in the Mathematics Classroom

ED 403 721

This presentation will consider attentional problems, particularly as they relate to the learning of mathematics. It is intended to investigate issues existing primarily *within* these students which prevent them from achieving up to their potential within the included/mainstream classroom. It will attempt to answer the following questions:

- What is an attention deficit disorder? Is there a difference between ADD and ADHD? (For the purpose of this presentation ADD and ADHD will be used interchangeably according to the source of the information.)
- Are attention deficits addressed within the Standards?
- Is ADD a "new" problem?
- How prevalent are attentional problems within the school-age population?
- How do attentional problems relate to learning disabilities?
- Are there differences in the manner in which attentional problems manifest themselves according to grade level?
- How can a mathematics teacher recognize attention deficits?
- Some math concepts to hate and some to love.
- What sources of information are available to teachers regarding a student's attentional problems and educational strengths and weaknesses?
- How can the mathematics teacher assist children with attention deficits and help them to achieve their mathematical potential?
- What about medication?
- How can the mathematics teacher document attentional issues and provide feedback to students, to parents and to other professionals?

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"Jim claims it triples their attention span."

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Are We Addressing The Standards?

NCTM's Professional Standards for the Teaching of Mathematics

The Four Assumptions About the Practice of Teaching Mathematics:

1. The goal of teaching math is to help *all* students develop mathematical power.
2. What students learn is fundamentally connected to how they learn.
3. All students can learn to think mathematically.
4. Teaching is a complex practice and not reducible to recipes or prescriptions.

Standard 1: Worthwhile Mathematical Tasks

The teacher of math should pose tasks that are based upon:

- knowledge of students' understandings, interests and experience
- knowledge of the range of ways that diverse students learn mathematics
- display sensitivity to, and draw on, students' diverse background experiences and dispositions

Standard 4: Tools for Enhancing the Discourse

The teacher of mathematics, in order to enhance the discourse should encourage and accept the use of:

- computers, calculators and other technology
- concrete materials used as models
- pictures, diagrams, tables and graphs
- invented and conventional terms and symbols
- metaphors, analogies and stories
- written hypotheses, explanations and arguments
- oral presentations and dramatizations

Standard 5: The Learning Environment

The teaching of mathematics should create a learning environment that fosters the development of each student's mathematical power by:

- providing and structuring the time necessary to explore sound mathematics and grapple with significant ideas and problems
- respecting and valuing students' ideas, ways of thinking, and mathematical dispositions

Standard 6: Analysis of Teaching and Learning

The teacher of mathematics should engage in on-going analysis of teaching and learning by:

- observing, listening to and gathering other information about students to assess what they are learning
- examining the effects of the tasks, discourse and learning environment on students mathematical knowledge, skills and dispositions

Current (but confusing) Statistics on Attention Deficit Disorders

There exists no clear data on the incidence of attentional problems. Estimates of prevalence among school age children range from as low as 1% to as high as 50%. Depending upon whose statistics you would chose to believe, this would account for 30 to 40 million children!

- most widely accepted number: 3% to 5%
- teacher ratings: 10% to 20%
- parent ratings: 30%

The reported ratio of boys to girls experiencing attentional problems is also variable. Girls tend to be less intrusive and aggressive, thus leading to fewer referrals:

- the ratio in clinics varies from 2:1 to 10:1
- the most cited ratio is 6:1
- the actual ratio is probably about 3:1

Hereditary factors: 30% to 40% of ADD students have inherited patterns of attention. Therefore there seems to be a neuro-chemical basis of ADHD.

- 20% of the mothers of ADD students report having attentional problems
- 30% of the fathers of ADD students report having attentional problems
- 30% to 35% of ADD students have biological siblings who are also diagnosed as ADD

Family members of ADD children have an increased incidence of psychiatric disorders (DSMIV, 1994).

- higher prevalence of Mood and Anxiety Disorders
- higher prevalence of Learning Disorders
- higher prevalence of Substance-Related Disorders
- higher prevalence of Anti-Social Personality Disorders

It was previously suggested that symptoms of ADD disappeared at adolescence due to hormonal changes. Current data has consistently proven, however, that although hyperactivity may decrease at this time, most ADD children continue to display symptomology to a significant degree in adolescence and on into adulthood (Barkley, 1990).

70% to 80% of ADD children become ADD adolescents
30% to 70% of these adolescents will become ADD adults

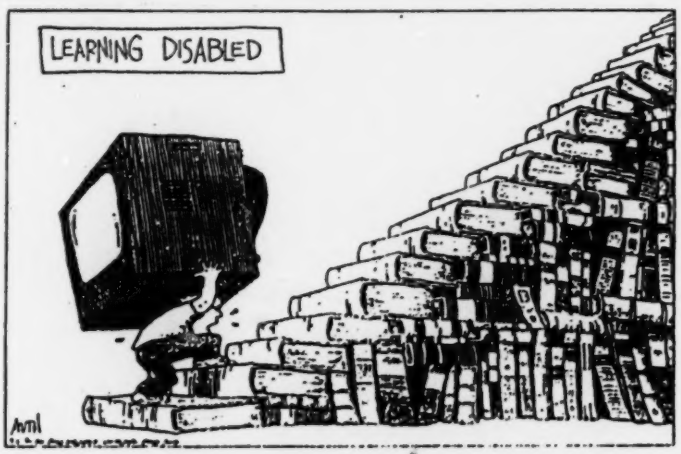
There is definitely an overlap between attentional problems and learning disabilities; however, the nature of the relationship is not well-defined and the statistics vary widely:

of LD kids, 20% to 25% are also ADD
of ADD kids, 50% to 85% also have LD
40% to 70% of ADD students display some symptoms of a conduct disorder

The incidence of adoptive children with ADD is 5 times the rate for their non-adopted peers. Reasons for this are unknown.

20% of adopted children are classified as ADD

80% of the children diagnosed as ADD respond well to medication.



Attention: Developmental Demands Over Time (Levine, 1992)

Preschool through grade one:
- need for basic activity modulation
- demand for concentration in group settings
- call for delays of gratification
- requirement to conform to routines
- encouragement of top–down information processing (as in reading)

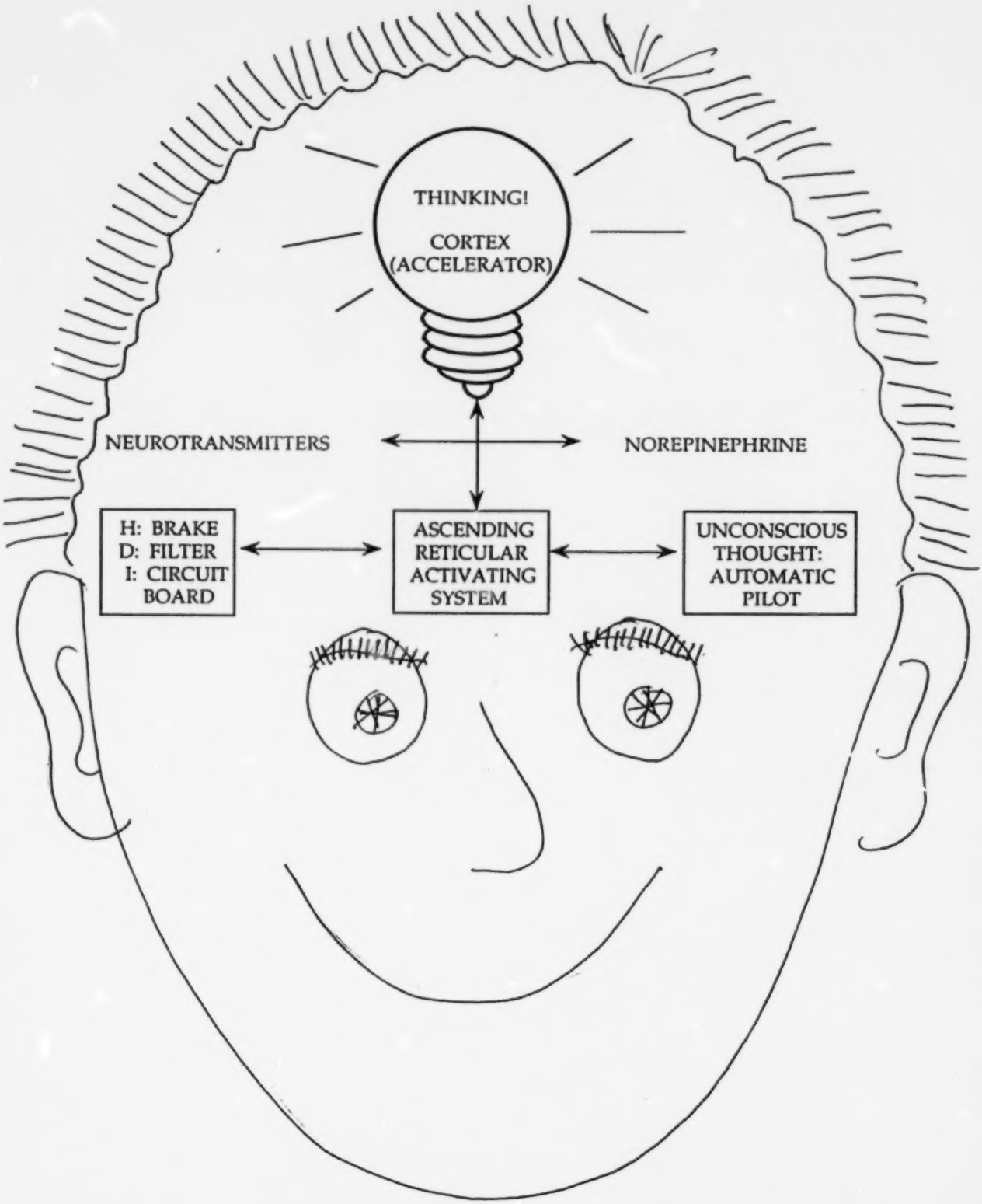
Grades two to four:
- greater demands for sustained listening
- need for enhanced filtration of distraction
- initial stress on reflection and task planning and self–monitoring
- call for task completion
- need for bottom–up processing (as in reading)

Grades five to eight:
- explosion of decontexualized information
- less predictable information flow
- growing social distraction
- need for attention in low interest contexts
- stress on extended academic effort

Grades nine to twelve:
- multiple degrees of saliency in information
- heightened attention–memory interactions
- growing affective distraction
- increased potential for mental fatigue

"It's difficult to reprimand some children for inattention in class."

A VISUALIZATION OF SILVER'S CONCEPTUALIZATION
(SILVER, 1992)



How to Identify Attentional Problems in the Mathematics Classroom

Hyperactivity refers to a problem within the central nervous system which makes it difficult for the individual to control muscle (motor) activity.

Behaviors associated with hyperactivity; the hyperactive student *may*:
- touch everything
- move constantly
- not be able to sit still
- climb on everything
- complete activities in a loud, noisy way
- be fidgety, particularly when not actively engaged
- tap his/her fingers and swing his/her legs
- need to get up and down often
- talks incessantly

Mathematical indicators of hyperactivity; the hyperactive student *may*:
- write large numbers and letters
- make numbers and letters that get sloppy over time

Distractibility refers to a central nervous system difficulty wherein the individual finds it difficult to filter out the unimportant information received from the senses and to concentrate or to pay attention to that which is important. Since all such stimuli compete for attention, the individual becomes easily distracted and is said to have a short attention span. At this time, research demonstrates but does not prove that distractibility is secondary to the inability to focus sustained attention (Silver, 1992). It is interesting to note that girls who are only distractible appear to be the group of ADD children and adolescents most often overlooked:

Behaviors associated with distractibility; the distractible student *may*:
- have difficulty sustaining attention in a group, but may do markedly better 1 on 1
- be easily distracted by peers
- react to all sounds, even those not heard by others
- ask to have information repeated frequently
- may experiences an auditory time lag
- notice minute details and changes in the environment
- constantly scan the environment
- touch or handle everything within reach
- experience "busy brain syndrome", especially in the presence of strong associative skills
- use tangential or cluttered speech
- may daydream during class and appear not to be listening
- doodle excessively
- experience sensory overload and tune out the immediate environment
- can attend and concentrate for great lengths of time when motivated
- become impatient or confused by details
- lose things
- fail to follow through on requests, instructions and/or assignments

Mathematical indicators of distractibility; the distractible student *may*:
- ignore operational signs; i.e., adds instead of subtracts
- make DAMN mistakes in computations (not *careless* errors!)
- focus on insignificant details; figure/ground problems
- experience "I've got it; I've lost it" disease
- forget what he/she is doing half way through the problem
- have difficulty with forced set shifting (especially gifted ADD students)
- perseverate with number writing or completing problems
- experience slow retrieval of information stored in long-term memory
- have difficulty completing classwork and assignments in a timely fashion or at all
- have difficulty finishing tests within the given time constraint

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How to Identify Attentional Problems (part 2)

Impulsivity refers to the individual's inability to take the appropriate amount of time to reflect upon outcomes before acting. The impulsive student simply does not have the luxury of time to think first. Hyperactivity and distractibility can be ignored by the peer group; impulsivity is less well accepted (Silver, 1992). Impulsive students can have an inordinate amount of difficulty dealing with the concept of paradox in mathematics. It appears that their lack of impulse control renders them unable to deal with a concept and its opposite simultaneously. I am convinced that students whose major issue is impulse control are those most at risk for mathematical distress.

Behaviors associated with impulsivity; the impulsive student *may*:

- have difficulty making transitions from one activity to another
- demand an inordinate amount of attention
- talk incessantly
- shout out answers in class
- make noises during class (this may be a symptom of Tourette's Syndrome)
- act without thinking and feel sorry later on
- not learn from mistakes (mathematical and otherwise)
- demonstrate a lack of concern for rules
- have difficulty taking turns or waiting for a turn
- not care about the rights of others
- physically bother other students
- be quick to blame others for his/her problems
- not be able to delay gratification
- lack appropriate inhibitions and may appear to be insatiable
- shift excessively from one activity to another, often without finishing either one
- start work before instructions are completed
- become frustrated quickly
- become angry as a result of frustration
- bump into objects and/or people; may be accident prone
- demonstrate poor judgment
- not appear to recognize cause and effect relationships
- ignore consequences
- be very rigid in thinking or behavior
- be unreceptive to the ideas of others, especially in group situations
- be unwilling to accept assistance from others
- lack organization

Mathematical indicators of impulsivity; the impulsive student *may*:

- display inconsistent number formation
- lack automaticity for number combinations or for mathematical processes
- have difficulty sustaining adequate effort to rigorous demands of math
- find repetitive math activities exceptionally boring
- say "It's easy!" and then get the problem wrong
- have sloppy, disorganized or incomplete work
- begin neatly and deteriorate quickly
- hate to erase; may do a lot of obliteration math
- finish work too quickly and may skip some problems without seeing them
- dislike writing down steps
- not learn from previous mistakes; may make the same errors over and over
- get one problem correct then miss one that appears to be exactly the same
- demonstrate a preference for mental math (a mathematical grasshopper!)
- lack self-monitoring skills and resist checking work
- "blank out" on tests
- find a method that works and then abandon it for no reason
- have inordinate difficulty with word problems
- provide hasty, often incorrect answers
- fail to finish assignments consistently

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Mathematical Concepts Likely to be Troublesome to ADD Students

subtitled: It's Always Best to Anticipate

Multiplication facts: Addition and subtraction do not demand that students automatize and use facts in the way that multiplication does. Additionally, it is quite cumbersome to employ manual strategies for multiplication. It can be exceptionally difficult for impulsive students to learn multiplication combinations, but don't give up too quickly!

Any multi-step process: Multi-digit multiplication and long division are the best examples of mathematical processes that are likely to bring about active working memory overload. ADD students have difficulty with the forced set shifting required by these processes.

Graphs and charts: These visual nightmares can be most confusing for ADD students due to visual clutter. With directed instruction and a verbal approach stressing interpretive reading, graphs and charts can become an enjoyable part of math.

Time: Students experiencing attentional problems often seem oblivious to time in their daily lives; therefore, it comes as no surprise that they have difficulty learning the rules relating to telling time. Additionally, learning to tell time accurately demands cognitive flexibility as there is often more than one correct way to read time.

Money: Although learning about money can be highly motivating, ADD students have difficulty mastering the concept of making correct change.

Measurement: The multiple conversion factors inherent in our system, tax the memory. The metric system, once learned, is much easier.

Algebra: Algebra is, by nature, a symbolic detail-oriented eyeball event. It is the combined effects of distractibility and impulsivity that make algebra particularly troublesome to ADD students. Additionally, these students continue to be plagued by DAMN arithmetic mistakes. The most difficult algebraic concepts include:

- positive and negative numbers; negative signs in general
- factoring and complex algebraic fractions
- radicals and imaginaries

Mathematical Concepts the ADD Students Often Like

subtitled: Escaping from Computation

Any concept relating to patterns: Pattern oriented-activities are highly motivating to ADD students and generally are not dependent upon their weaker computational skills.

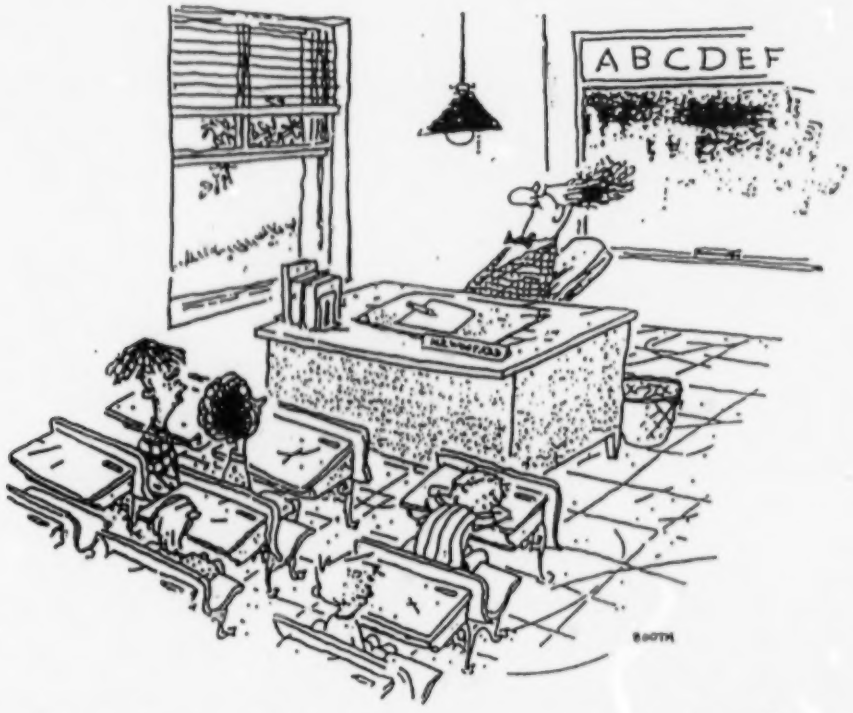
Estimating: ADD students, especially those with impulsive tendencies, do not always feel the need to get THE perfect answer; consequently, they are more than willing to arrive at estimated answers. In contrast, I have found that most of my other LD students despise estimation!

Graphing in algebra: Graphing often comes as a welcome relief to the cluttered, symbolic, detail-oriented drudgery of algebra.

Geometry: Geometry is a "mouth man's math"! Computations are minimal, and instruction is highly visual.

How Teachers Can Help the Math Student Struggling with an Attention Deficit Disorder

There is no simple or singular solution to the problems associated with an attention deficit disorder. No method will work for all students, and the same method will not always work for a specific student. Research demonstrates that a multi-disciplinary approach which includes medical and psychological intervention, special educators, teachers, parents and the individual student will yield the greatest likelihood of success. Our challenge as teachers of a student experiencing attentional problems is to maintain or to improve self-esteem while encouraging excellence through metacognitive awareness, organization and persistence. In order to truly help, it is essential that the teacher has current, comprehensive information concerning the nature of the student's difficulty. Even more important, the teacher needs to have a thorough working knowledge of the student's existing strengths as they constitute the quickest and surest route to long-term improvement.



"You will like Mr. Woofard. He has an attention-deficit disorder."

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Classroom Management Strategies for ADD Students
a.k.a. Environmental Issues

Students who are experiencing attentional difficulties generally succeed best when provided with clear, consistent and predictable rules for appropriate behavior and for standards of work. Additionally, consequences for inappropriate behavior should be meaningful to the student and should be instituted immediately in order to be effective.

ADD students are likely to experience difficulty with transitions, both between classes and within classes. This is particularly true when they are asked to move from an activity that they enjoy to one that they do not (could this mean math?). It is important for teachers to plan carefully for such times and to warn students of impending change.

Students with attention deficits should receive preferential seating within the classroom according to their current need. Generally, the younger the student, the closer he/she should be to the teacher. This allows the teacher to closely monitor the student's level of attention and allows for discrete intervention if necessary.

The student should be seated so that he/she is not directly facing another student. Faces of peers often encourage over-stimulation and attention-getting behaviors.

Pre-arranged, unobtrusive signals between the teacher and the student can be most helpful. Such signals can escalate from physical proximity and verbal cues to tactile reminders.

Teachers should make an effort to encourage ADD students to participate during class. If their attention appears to be waning, they can be re-focused by calling their names *before* you ask them a question. Also, whenever feasible, call on them if they have their hand raised.

Impulsive students can have a real problem with blurting out of answers during class. Although enthusiasm is always encouraged in math, chaos is not; consequently, clear rules regarding answering questions need to be established which should be followed by the entire class.

Most students who experience attention deficits will work more effectively when their immediate work area is free of objects likely to cause distractions.

ADD students do not always relate well to their peers and are likely to experience difficulty with cooperative learning groups. Composition of such groups should be considered carefully to avoid unnecessary confrontations.

It is often best to ignore smaller issues while focusing on those which appear more critical to a student's ultimate success. For example, students with attention deficits find it difficult to write neatly at the same time as they are concentrating on problem solving.

Try to channel a child's hyperactivity by allowing him/her to direct excess motor responses into socially-appropriate behaviors. These might include handing out papers, running errands or tapping their fingers on their legs instead of on their desk. Also chewing gum can channel hyperactivity as well as anxiety during test taking situations. Insist that all such accommodations are not disruptive for the other students.

ADD students often react positively to appropriate reinforcers. Unfortunately, however, these perks and benefits will have to be changed constantly in order to have the desired effect. For this reason, I am not crazy about behavior mod as the sole strategy to use for ADD students.

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Teaching Strategies That Are Likely to Help
subtitled: Recognize Strengths!

Students should be allowed to use calculators whenever possible to assist with the computational aspects of mathematics. It is important to re-emphasize that NCTM recommends calculator use for all students. Additionally, ETS actually encourages the use of calculators for PSAT's and SAT's. Additionally, the use of the calculator is required for the SATII Math IIC.

Try to incorporate novel and motivating teaching methods, especially for the more repetitive, less exciting aspects of math since ADD students often describe math as "boring". Use in-class games and computers whenever possible. Be excited about math!

Rotate ADD good thing with ADD bad things, i.e., follow decimals with geometry

Identify and evaluate pre-requisite skills at the beginning of a new unit in order to recognize existing skills deficits. For example, when beginning a unit on GCF's of factoring, students should be timed for the retrieval of the 100 basic number combinations.

Initiate instruction by providing an overview and a purpose (both within math, but preferably in the REAL world as well) for the concept to be covered. Whenever possible, allow students to be actively involved in the "discovery" of the method through the use of manipulatives. ADD students pay considerably more attention to instruction that they believe to be useful and interesting.

Make learning as visual as possible. Hang up posters listing all necessary steps for the entire class to use or provide individual sheets for those students who need them.

Recognize the cognitive flexibility of the student. Many non-ADD math students benefit from multiple, diverse explanations that provide depth to their understanding. Due to their cognitive rigidity, many ADD students find such discussions more confusing than helpful. Choose the initial teaching strategy very carefully, and warn students before you attempt to use alternative methods.

Think aloud as you solve problems. This modeling process should stress cause and effect relationships within the problem, and can heighten students' metacognitive awareness. Encourage students to use this self-talk strategy as well.

Promote elaboration, a.k.a., "So what?" ADD students often possess a surface understanding (skinny knowledge) of math concepts; this fact alone makes retention, application and generalization difficult. For example, when discussing isosceles triangles, require the student to provide all known properties, not just the one that applies to the particular problem being solved.

ADD students will probably require explicit, one-on-one instruction any time they encounter a new type of word problem.

Develop a system of color coding to assist students with the organizational aspects of math.

Be particularly sensitive to ADD students who also experience fine motor difficulties. They might require special accommodations in all aspects of mathematics instruction: classwork, note taking and testing. Often, frustration with writing tasks is the underlying cause for a lack of motivation and a consequent lack of learning in middle school students.

Due to their lack of self-monitoring, ADD students have a difficult time recognizing their need for help. It is left to the individual teacher to determine when additional assistance is needed and to seek out the student to schedule an appointment for extra help.

Keep directions short and simple. Repeat instructions and directions more than once, especially when they deviate from expected practice. Assume that the ADD student will need personal clarification as well.

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Strategies to Encourage Within ALL Students

Encourage students to ask questions before they are totally lost. This will help each student to become more tuned into instruction; nothing causes distractibility faster than a lack of understanding.

Encourage students to seek *regular* individual attention through the resource room or math center, through extra-help sessions or through peer or professional tutors. Symptoms of ADD decrease, sometimes dramatically, during one-on-one instruction.

Encourage students to employ mnemonic devices whenever possible in order to speed information retrieval and to save cognitive energy. Although the ultimate goal would be for students to create these tricks independently, they are likely to need considerable instruction in this task initially. One of my favorite student-derived division mnemonics is: **D**inosaurs **M**ust **S**urvive **C**omplete **B**rain **D**amage.

Require students to create a written description that paraphrases any mathematical process they find confusing. This verbal mediation allows students to utilize their spontaneous language skills while it provides them with practice in writing out a precise sequential process. Additionally, it creates a verbal dialogue (speeches!) for later use.

Require students to maintain their own "DAMN MISTAKE" list, generated through homework and tests. The purpose of this list it to develop a meta-cognitive awareness of the steps or problems that are most likely to lead to costly repetitive errors.

Encourage students to use color whenever appropriate to heighten their visual attention to troublesome aspects of the problem, i.e., operational signs or negative signs.

Require students to learn the proper words for and the definitions of the concepts being covered *as they go along*. If students do not comprehend the terms, they are far more likely to experience attentional lapses during instruction.

Encourage students to write down or to draw pictures of everything. The goal is for students to use their pencils to get the mathematics out of their heads and onto a piece of paper. This is an active step that can tap into stronger recognition (vs. retrieval) skills. Additionally, many ADD students possess amazing artistic skills.

Encourage students to create individual verbal analogies relating current math concepts to their existing background knowledge, both within math and, whenever possible, within the real world. This latter activity can allow students to perceive mathematics as a useful activity to be incorporated into their everyday lives.

Help students to locate an appropriate "study buddy" who can be counted on to provide assistance in-class, after-class and even out-of-school.

Encourage, applaud and provide extra credit for writing out the necessary steps of problems in a consistent manner. This insistence on creating a consciously-organized structure for similar problems is likely to have long-term beneficial effects that students can carry along with them to later math courses.

Stress the organizational aspects of math. Encourage the use of 3 ring notebooks with separate areas for class notes, for definitions and for homework. Finally, require students to maintain a section for *corrected* tests and quizzes to be used to study for cumulative tests.

Require students to set a variety of individual goals: for classroom behavior, for performance on quizzes and tests and for homework. Additionally, require them to keep an on-going record of their grades so they can compare their goals with their current status.

Encourage students to look back at examples any time they get stuck. Such examples can be found in the book or in their notes and can provide a concrete set of steps to follow.

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Homework and the ADD Student

Homework provides an excellent opportunity for on-going teacher feedback. If work is well done, provide appropriate praise and encouragement. If work does not meet teacher expectations, immediate steps should be taken to work individually with the student. Parents and other professionals should be contacted if this initial intervention is not sufficient.

Homework should promote practice for the sake of learning and automatizing new skills. Although this surely involves repetition, busywork should be avoided. Numerous short practice sessions will be far more effective than one long page of the same type of problem.

Provide important information concerning upcoming assignments early in the class period when students' attention is likely to be greatest.

Never give verbal assignments. Written weekly assignment sheets that are numbered and have a check-off area are most helpful. Otherwise, homework should be written on the board in the same location everyday.

Students should be given ample time to copy assignments correctly without hurrying. If difficulty persists with homework completion, the assignment book should be checked and initialed daily by both teachers and parents.

Students must be reminded to check each problem upon its completion. Under no circumstances should problems be assigned without the availability of answers. Since ADD students are likely to exhaust their cognitive energy on the initial problem solving process, they should be encouraged to correct their own work on a calculator whenever possible.

Homework should **always** be checked for completeness but should not be graded. It should be viewed as a tool for learning, not as an outcome of learning.

Students should be encouraged to locate and to name the mistakes that they make on their homework. Such problems should be marked with a colored pencil or marker to be re-done in preparation for the test.

It is important to recognize that problems which could be finished in 10 minutes during a supervised class period might take the student as long as 30 minutes to complete at home without assistance. Stress quality as opposed to quantity.

Teachers should ask students to time themselves as they complete their homework. This strategy can help the teacher develop an appreciation for their processing speed at the same time it is likely to keep the students moving along at a timely pace. Finally, this tactic will encourage the development of automaticity so that students will require less cognitive energy to complete problems.

Do not give cute, cluttered worksheets for independent homework assignments. Problems should line up neatly with plenty of space in between. Troublesome assignments include: dot-to-dots, papers with pictures to be colored, hand-written copies and copies of poor quality.

Whenever possible, homework and classwork should be completed on graph paper (1 cm or 1/4 inch according to the age of the student and the job to be done) to assist in the process of organization and number alignment.

Provide students with an ample amount of easier problems before expecting them to move on to more difficult ones. Stress similarities of new problems to previous ones.

Keep a brightly colored "in box" in the most prominent place possible. ADD students are notorious for forgetting to turn in assignments, even ones that they have completed.

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Assessment Strategies for ADD Students

Effort grades are inappropriate for ADD students who often need to expend additional energy than would be expected simply to sit still and get the job completed. Additionally, effort is a highly subjective and invisible commodity.

Long, cumulative tests, such as midterms and finals, are particularly difficult for ADD students. Such tests capitalize on existing and often well-documented weaknesses and rarely demonstrate the student's actual knowledge of the subject matter. It is best for such tests to be given over several class periods with each section covering a specific type of problem.

Provide as many alternative methods of assessment possible since tests do not always adequately reflect an ADD student's actual ability or knowledge of the subject matter. This could include (but not be limited to) written assignments, oral or written reports, journals, projects, posters, notebooks and test corrections.

Time is likely to be a significant factor for ADD students for two conflicting reasons. Impulsive students, who work too quickly and without adequate self-monitoring, should be required to spend a minimum amount of time before handing in their tests in order to encourage them to check their solutions. Students who struggle with distractibility may require additional time to account for fluctuations in their focus and in their energy levels.

Consider giving credit for creating notecards to aid in the process of vocabulary retention. Tests and quizzes should always include written definitions.

Consider allowing extra credit assignments, especially when the student experiences a single bad grade on a test.

Create tests which emphasize concept understanding as opposed to testing stamina.

Provide clear written instructions, highlighted, boxed or underlined, at the beginning of each section of the test that demands a shift in process.

Encourage students to work slowly and carefully and provide appropriate credit for all correct steps demonstrated. Test grade methods that do not provide partial credit are to be avoided at all costs!

Attempt to provide a quiet testing environment which can be critical to the success of the ADD student. If the regular classroom is not quiet enough, the student should be provided with an alternative testing arrangement.

During tests, give students notice of how much time has elapsed or remains at regular intervals. Although this tactic might increase anxiety, it can help students remain focused on the test.

Provide ADD students with plenty of space on all test papers. This encourages them to organize their work and to complete all steps of the problem. Scrap paper (graph paper, please!) should always be provided and should not be thrown out without inspection.

Whenever possible, separate process testing from computational testing. For example, when testing the process for long division, have the student create their own multiplication chart as part of the test.

Calculators should be made available whenever possible during tests.

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Teachers and the Psychological Factors of ADD

Take every possible precaution to keep ADD students from feeling embarrassed in front of their peers. Although it may come as no surprise that sarcasm is never acceptable. Keep in mind that ADD students may have subtle language processing problems that render it difficult for them to interpret comments that were meant to be humorous.

Never exchange test papers among students for grading purposes. Be especially sensitive to a student's feelings when returning a sub-standard performance.

Never refer to mistakes as "careless errors." This term denotes a subtle value judgment; I have yet to meet a student who makes errors due to a lack of caring. Additionally, ADD students have already been provided with ample negative labels, many of which they have incorporated into their self-image. It would be more productive to name the type of error made; for example, to say that the student had made a computational error.

Assist ADD students with recognizing and applauding their often-substantial strengths, i.e., artistic excellence, so that these skills can be used to help overcome deficits in other areas.

Students are likely to experience attentional problems for a variety of reasons. Keep alert for indications of obsessive/compulsive disorders such as an inordinate need to check and re-check problems. Such symptoms could be indicators of other problems, such as Tourette's Syndrome. Also, attentional problems are also an indicator of depression, especially during adolescence.

Remember that many ADD students, particularly those who remain highly motivated to achieve, will experience periods when they are unable to maintain the rigor and hyper-attention that allows them to succeed.

Expect inconsistencies! This problem is prevalent in ADD students and can be the cause of frustration to teachers, to parents and to students alike. Generally, a short-term decrease in performance should be met with positive encouragement, not by punitive measures.

Students experiencing attentional problems can become easily overwhelmed when presented with too many math problems at one time. This can be the case for classroom assignments, for homework or for tests. Unfortunately, this situation often causes anxiety and frustration and virtually always leads to decreased performance.

Maintain a close dialogue with parents concerning progress, classroom behaviors and medication issues. This communication can often be carried out within the student's assignment book.

Schedule an individual meeting to ask the student what classroom accommodations might help. Ask how the student has learned best in the past, and ask which math concepts have been the most difficult. Even if he/she cannot provide specific responses to such questions, most ADD students will appreciate the fact that you bothered to ask.

Remember your own psychological needs. Teachers can quickly become exhausted and/or frustrated by ADD students. Seek help and support from the family and the school. Consult with resource room personnel and non-school professionals who might have specific knowledge of the student or general knowledge of attentional problems.

ADD students can become easily discouraged. Be a cheerleader, a realistic optimist and applaud *genuine* success.

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Organizations for Attention Deficit Disorders

Attention Deficit Disorder Association (ADDA): (800) 487-2282

Children and Adults with Attention Deficit Disorder (CHADD): (305) 587-3700

Learning Disabilities Association of America (LDA): (412) 341-1515

Amazing Video! (1990) How Difficult Can This Be? The F.A.T. City Workshop. Alexandria, VA: PBS Video.